

Photonic Network System in City of Chitose and Role of CIST

**Hiroyuki Sasabe, President
Chitose Institute of Science & Technology**

Abstract: City of Chitose has already constructed the optical fiber network system (intranet system) and now tries to develop WDM system in addition. Under the strong support by CIST, interactive contents such as lifelong education and virtual mall are intensively developed. Following a short introduction of CIST, the master plan of the model of WDM/Intranet System in City of Chitose will be explained.

Major Projects in Chitose

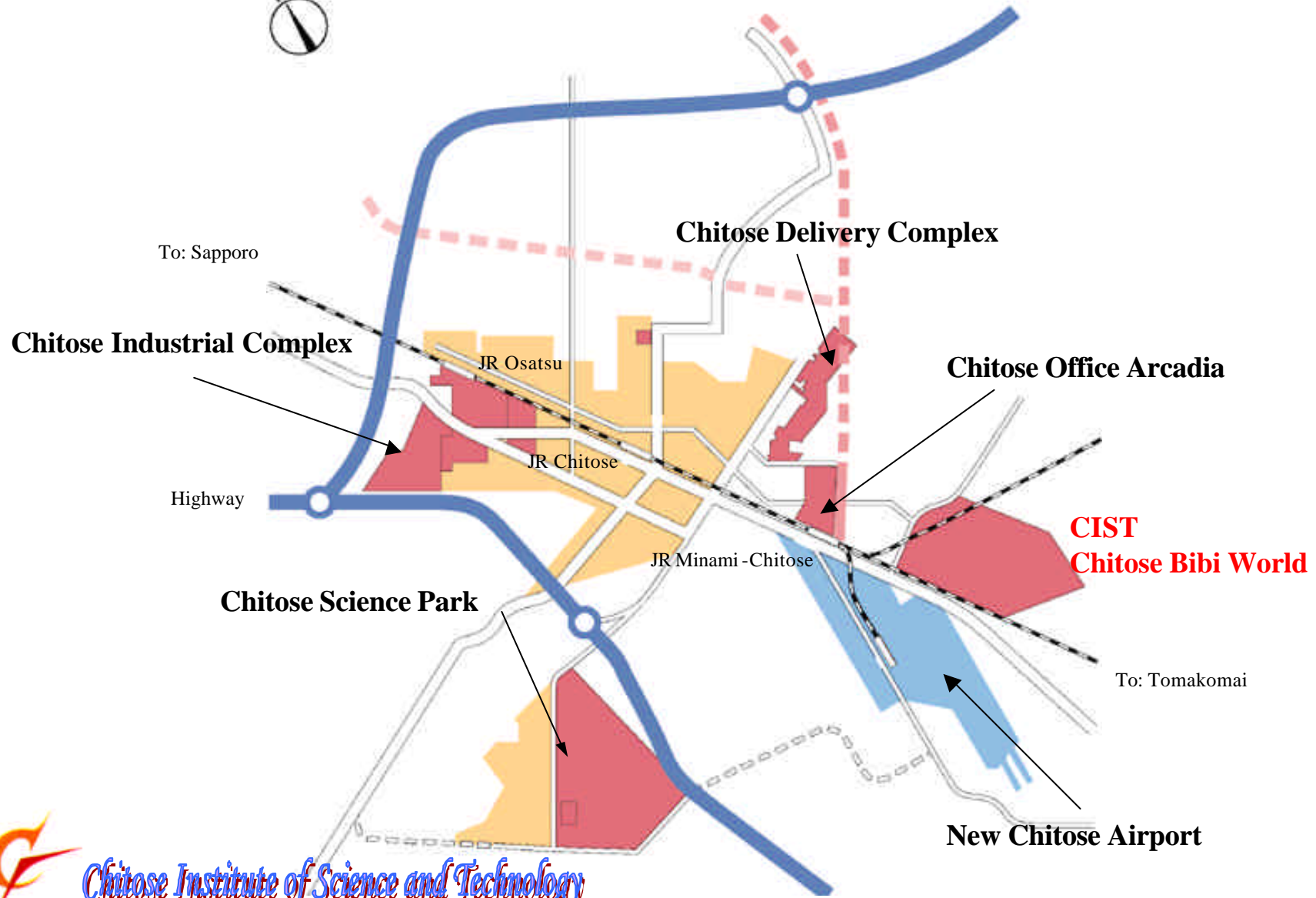
Large-Scale Projects

- | Hokkaido Aeropolis Project
- | Central Hokkaido Technopolis Project
- | Basic Project for the Chitose-Tomakomai Core City Area
- | **Intranet Systems and Photonic Trial Project**
- | **Ubiquitous-based Local Community Project**

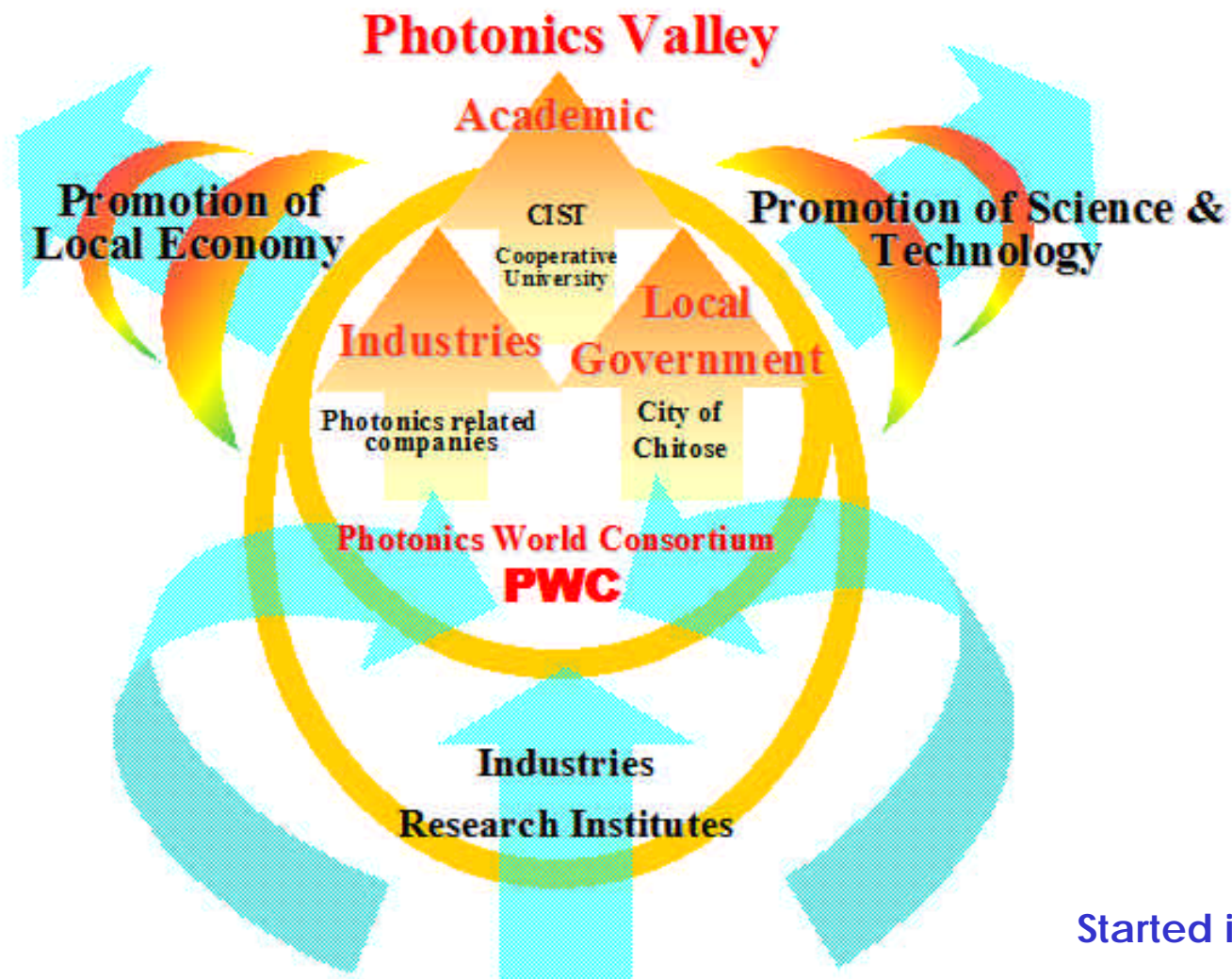
Development Projects located around New Chitose Airport

- | Chitose Bibi Project: **Photonics Valley Project**
- | Chitose Office Arcadia Project

Chitose Industrial Complex



Scheme of Photonics Valley Project



Started in 1995

Scheme of Photonics Valley Project

Photonics World Consortium (PWC)

Collaborative Coordination

Technological Coordination

Technology Transfer of Fundamental Researches

Chitose Institute of Science & Technology (CIST) Graduate School of CIST

Fundamental/ Practical Researches

Human Resource Development

Intellectual Accumulation

Human and Intellectual Interaction between
Academia and Industry



Chitose Institute of Science & Technology (CIST)



Chitose Institute of Science and Technology

History of CIST

Foundation: April 1, 1998

1 Faculty (Photonics Science and Technology)

2 Departments: Photonics Materials Science

Applied Photonics System Technology

1st President Prof. Keisuke Sasaki (April 1998 – Oct 1998)

2nd President Prof. Naoya Ogata (Nov 1998 – March 2002)

3rd President Prof. Hiroyuki Sasabe (April 2002 – to date)

Graduate School: April 1, 2002

1 Department (Photonics Science and Technology)

1st Dean Prof. Hiroyuki Sasabe (April 2002 – to date)

International Meetings

ICONO'4 (4th International Conference on Organic Nonlinear Optics)
Oct 12 – 14, 1998

CIF'1 (1st Chitose International Forum on Organic Photonics)
Oct 6-8, 1999

ISOM 2000 (International Symposium on Optical Memories 2000)
Sept 5-8, 2000

CIF'2 (2nd Chitose International Forum on Organic Photonics)
Sept 6-9, 2001

CIF'3 (3rd Chitose International Forum on Organic Photonics)
Oct 6-9, 2002



Photonics World Consortium (PWC)

Foundation : August 28, 1997 as a private organization

June 6, 2001 approved as a non-profitable organization (NPO)
(under the '*Photonics Valley Project*' promoted by the City of Chitose)

Objectives : Formation of worldwide R&D Base on photonics sci & tech

- Development of organic optoelectronic materials and devices for optical communications, photonic network systems, etc
- Base for intimate collaboration among academia, industry and local government
- Human resource development, technological innovation toward application, and formation of human networks in the field of photonics

President: Prof. H. Sasabe (CIST) (June 2002 -)



Research Cluster Activities in PWC

Biophotonics Research Cluster

Cluster Coordinator: Hiroyuki Sasabe (CIST)



1966	Master of Engineering, University of Tokyo, Applied Physics
1972	Doctor of Engineering, University of Tokyo
1966-1974	Electrotechnical Laboratory, AIST, MITI
1974-1983	Associate Professor, Tokyo University of Agriculture & Technology, Dept. Electronic Eng.,
1983-1999	Chief Scientist, The Institute of Physical and Chemical Research (RIKEN)
1999-date	Professor, Chitose Institute of Science & Technology (CIST), Dept. Photonics Materials Sci.
2002-date	President of CIST, Dean of CIST Graduate School

This cluster aims Primarily at the basic understandings of what is biophotonics and how to develop biophotonics through the literature survey, and then seeks the target programs available in the local area of Hokkaido. One of the promising targets is the medical diagnostics and therapy using photodynamic techniques, and the other the agricultural applications using photogenetic modification of plants. Under these activities we will form a consortium to propose a national project on biophotonics to the Government.

Organic Semiconductor Devices Research cluster

Cluster Coordinator: Chihaya Adachi (CIST)



1991.3	Doctor of Engineering, Kyushu University
1991.4	Ricoh Co.Ltd., Chemical Products R&D Center
1996.8	Research Associate, Shinshu University, Department of Functional Polymer Science
1999.5	Research Staff, Department of Electrical Engineering, Princeton University, USA
2001.7	Associate Professor, Department of Photonics Materials Science, CIST

The research objective is for exploring a new electronic world, organic electronics (OE). Since the 1980's, the progress of organic semiconductors in both low molecular materials and polymers are expanding due to the unique electronic properties as unlike as inorganic semiconductors, leading to novel optoelectronic applications. We will focus on electronic and optical properties of organic semiconductors which open novel optoelectronic applications. Through discussion and investigation of previous papers, we explore new organic device applications and develop the device performances. Furthermore, we'd like to establish device physics of organic semiconductors.

Research Cluster Activities in PWC

Organic Nano-tech Research Cluster

Cluster Coordinator: Olaf Karthaus (CIST)



1988	Diploma Degree from the Faculty of Chemistry of the Johannes Gutenberg University, Mainz, Germany
1992	Doctor Degree (Dr.rer.nat) from the Faculty of Chemistry and Pharmacy of the Johannes Gutenberg University, Mainz, Germany
1992-1993	JSPS and Alexander-von-Humboldt fellowship at the Faculty of Engineering of Tohoku University, Sendai, Japan
1994-2000	Research Associate at the Research Institute for Electronic Science, Hokkaido University, Sapporo, Japan
2000	Associate Professor, Chitose Institute of Science and Technology

Nanotechnology is an integral part of photonics science and technology. For various applications in the field of photonics and electronics it is necessary to control the nanoscopic structure of organic molecules, their orientation, and aggregation.

Nanotechnology can offer various ways to achieve the goals of highly functional novel device. For example, the self-assembly of molecules offers the possibility to pattern molecules on the molecular level, something that is difficult for the common technique of lithography. The Nanotech Cluster will bridge the gap between the present state-of-the-art science and possible future applications and will offer seeds for future applications of nanotech devices.

Photonic networks and broadband access systems

Cluster Coordinator: Masaaki Kawase (CIST)



1972	Master of Engineering, Hokkaido University, electrical engineering
1991	Doctor of Engineering, Hokkaido University
1972-1999	NTT Laboratories
1999-date	Professor, Chitose Institute of Science & Technology (CIST)

This cluster studies research and development trend or direction of recent photonic systems, such as photonic networks and broadband access networks, which lead innovation of traditional communication networks. Also it discusses novel devices, components, and sub-systems for such advanced networks or systems from the viewpoint of market needs and find business opportunities.

The cluster is planning various kinds of activities, such as meetings, lectures, forums, and publishing reports, etc., during the fiscal year 2002.

Research Cluster Activities in PWC

Ultrafast and Broadband Optical Technology and Its Applications Cluster

Cluster Coordinator: Mikio Yamashita
(Hokkaido University)



1970	Master of Engineering, Department of Electronics Engineering, Kyoto University
1976	Doctor of Engineering, Department of Electronics Engineering, Kyoto University
1970-1991	Electrontechnical Laboratory, AIST, MITI
1978-1979	Imperial College, University of London
1991-1994	Professor, Department of Engineering Science, Hokkaido University
1994-	Professor, Department of Applied Physics, Hokkaido University

Ultrafast and broadband optical technology is applied in not only optical communication technology, but in chemistry, biology, nano-technology and many other fields. In this cluster, we try to apply ultrashort optical pulse technology in various fields and to propose novel functions, techniques, devices and system that utilize temporal, spectral, spatial, coherent and ultrabroadband characteristics of ultrashort optical pulses.

Development of Phonic Network and New Web Application System Cluster

Cluster Coordinator: Suguru Horinouchi (CIST)



1991-1993	Keio University (Master Course): Development of fiber optics
1993-1996	Keio University (Doctor Course): Development of fiber optics
1996-1998	Visiting Researcher of Keio University
1998-2001	Telecommunication Advancement Organization (Government Project) Project sub-leader
1998-now	Lecturer of Chitose Institute of Science and Technology
2001-now	President of Gootech Corporation

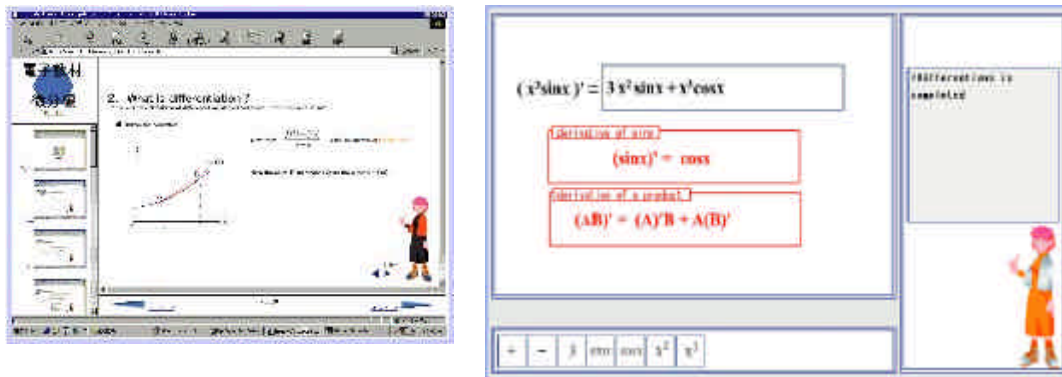
Technologies for the phonic network and new web application system are studied in this cluster. Market research and forum will be held among this group. Active people are strongly welcome to create new technology. One of the important subjects is high speed access area network system (photonic network system) using plastic optical fibers (POF), and the research about new materials, devices, integrated systems is carried out.

-Multimedia Pilot Town Project- *from 1998*

Construction of the regional information database and system

by Prof. Komatsugawa

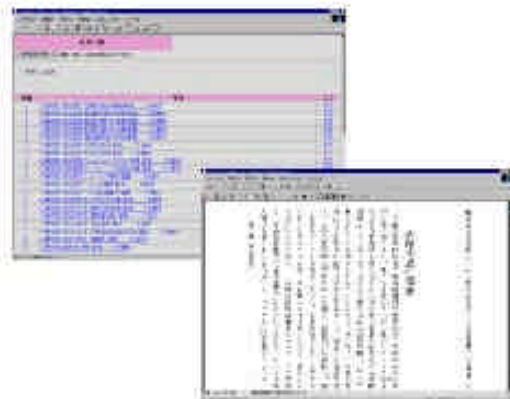
E-Learning including 1,000 materials and exercises of mathematics for the junior, the high school and the college students.



Virtual University and Library in which users can walk through CIST and the city library.



Digital Library including 15,000 pages of historical data in Chitose



Distance Learning including the memorial lectures in CIST



New Stage - *from 2001*

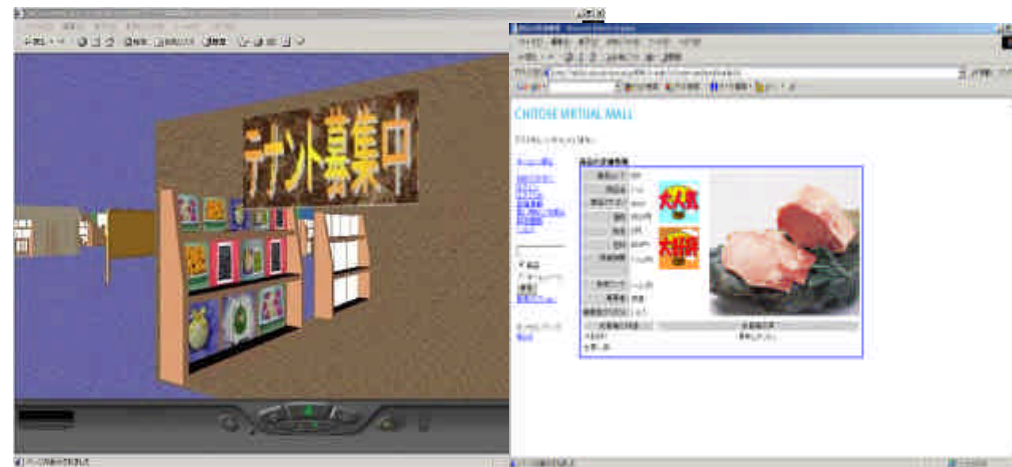
Field Test Collaborated with Chitose Citizen

by Prof. Komatsugawa

E-Learning System is not only used in junior high schools of Chitose but widely used in Hokkaido area.

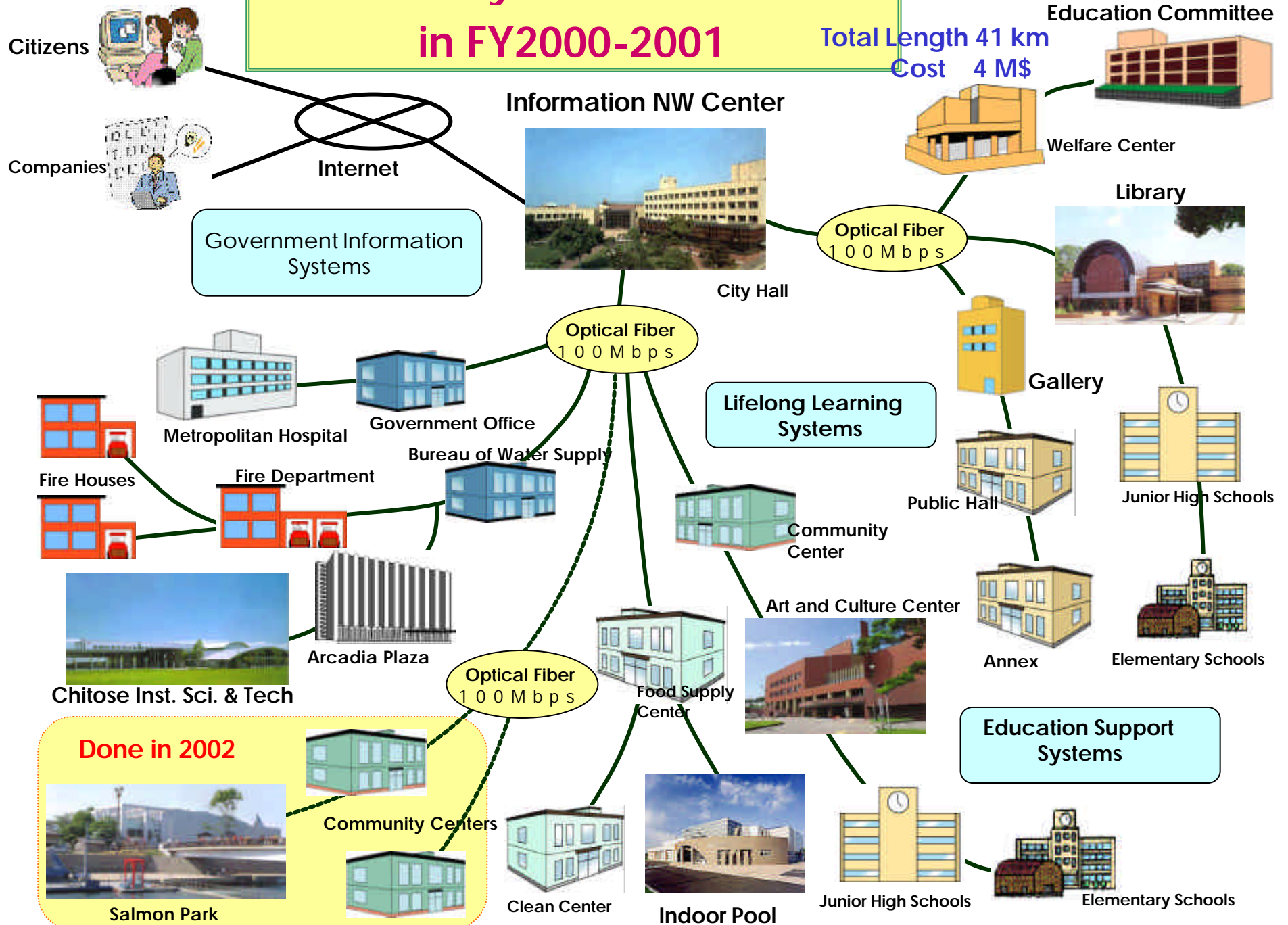


Virtual Market Place is starting with the Local Chamber of Commerce of Chitose.



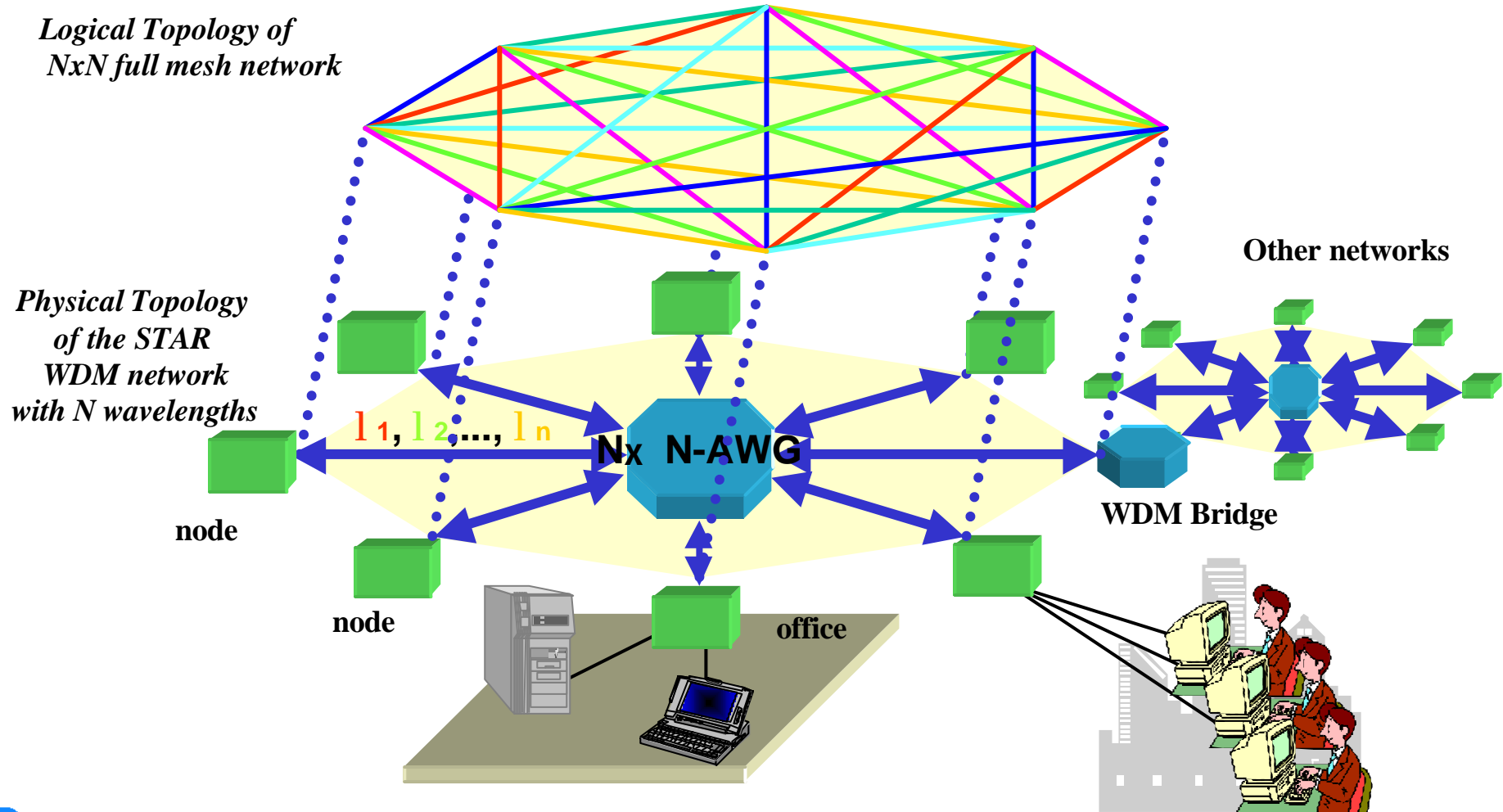
Intranet Systems in Chitose in FY2000-2001

Total Length 41 km
Cost 4 M\$

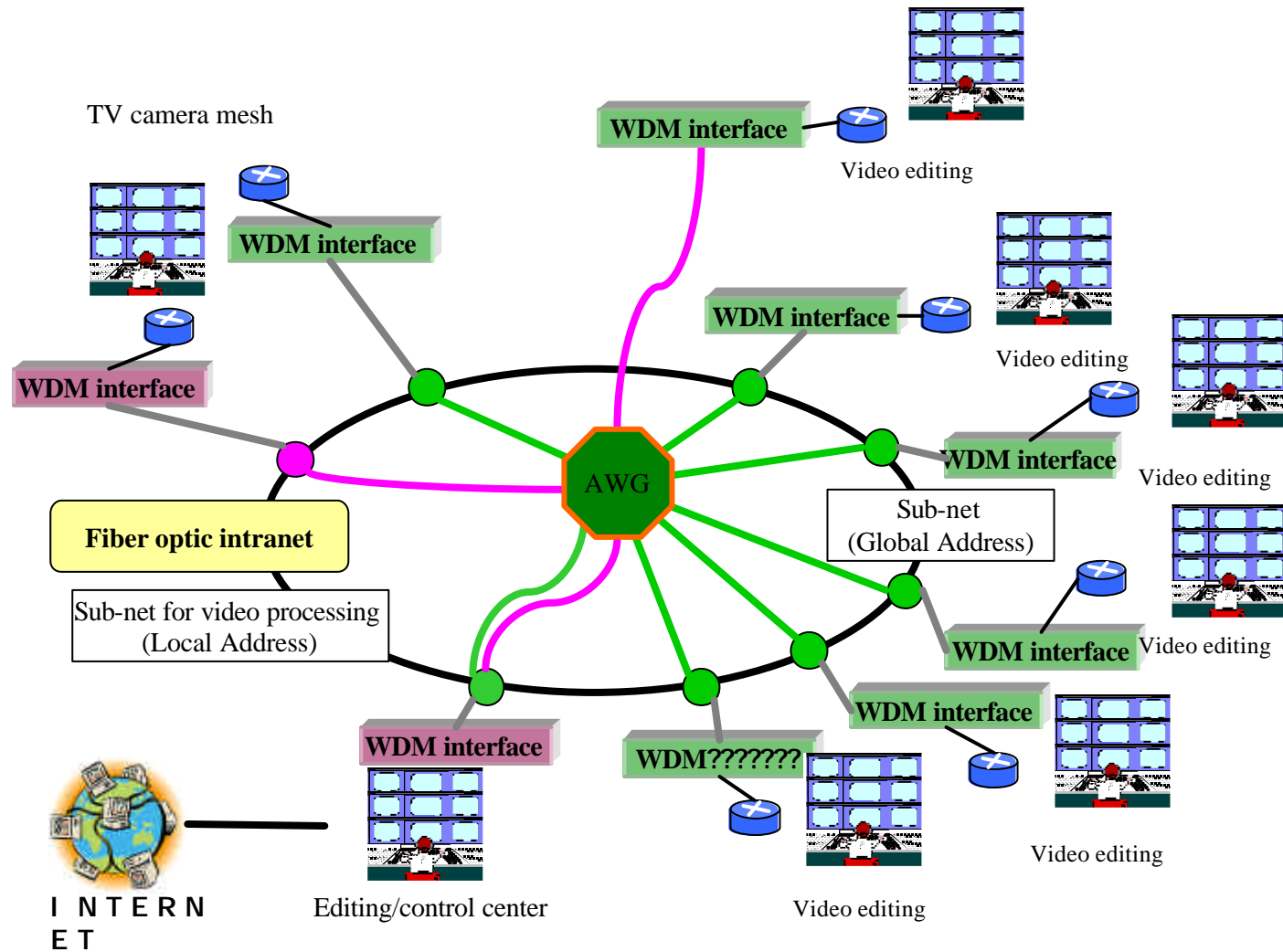


Photonic Trial: AWG-STAR Network

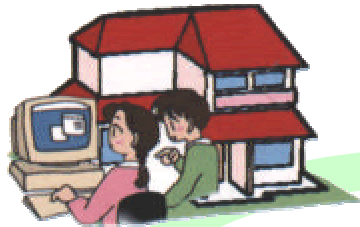
AWG-STAR is a WDM network which routes signals based on wavelength (wavelength routing results in the creation of a wavelength path)



Network Structure

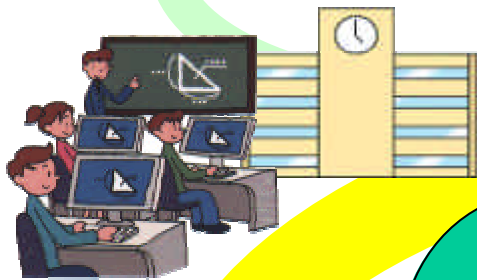


Ubiquitous-based Local Community



Broad Band Access NW

Broad Band Access NW



Wireless LAN



Photonic Network

Multi-Agent Systems

Local Community Database

- Interactive Contents
- Lifelong Learning
- Education Welfare
- Commerce Visitors' Business

Local Community System

- Lifelong Learning System
- E-Learning Support System
- 3D Virtual Mall System

Citizens' Participation



Delivery of High Quality Media

Large Capacity

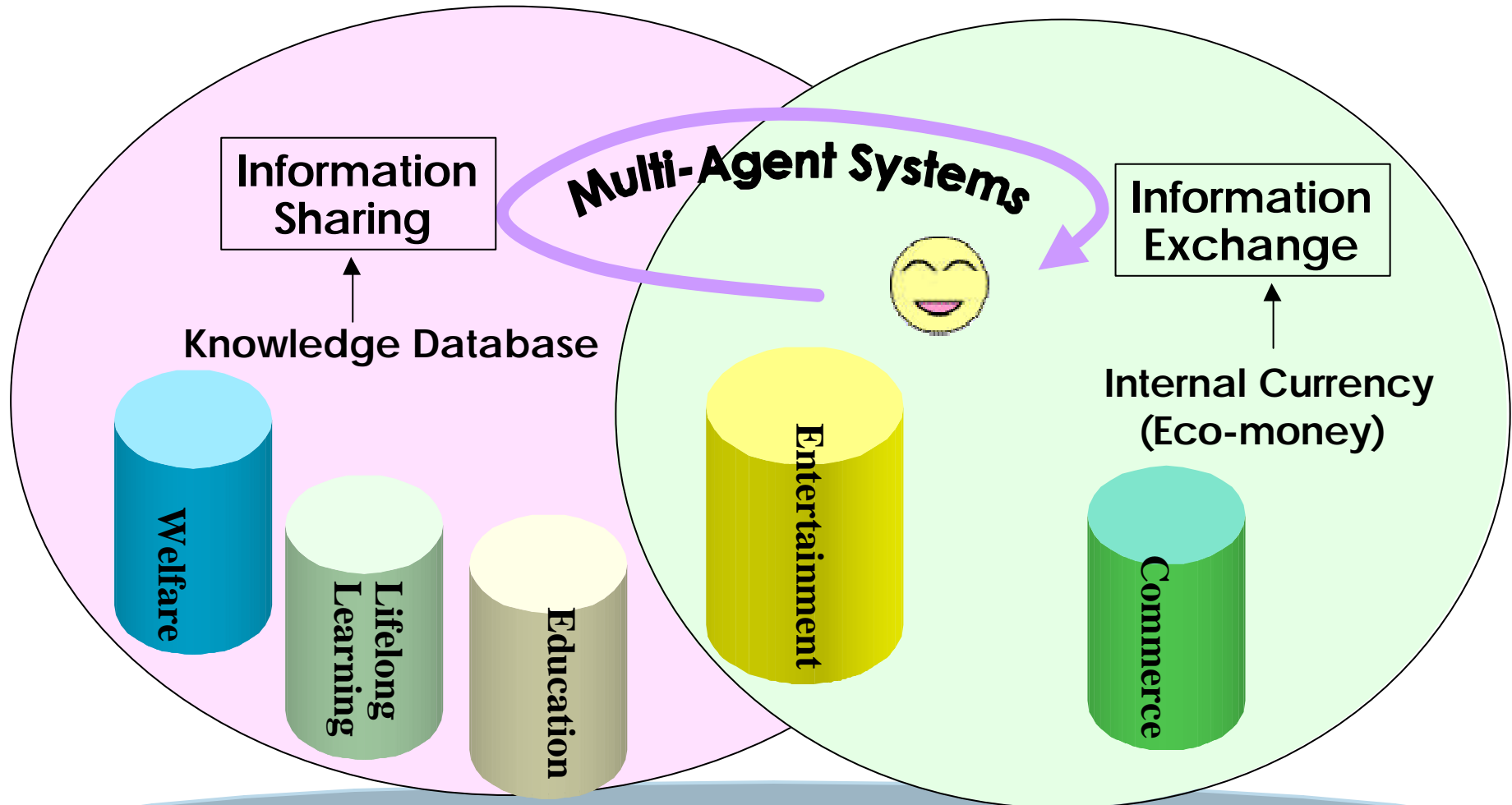
Ultrafast



Test Bed for Ubiquitous-based Local Community

Social Community

Business Community



Single Sign-on Platform
for Decentralized Authentication Systems

MIND in Chitose 21

千歳市地域情報化計画
[基本構想・基本計画]

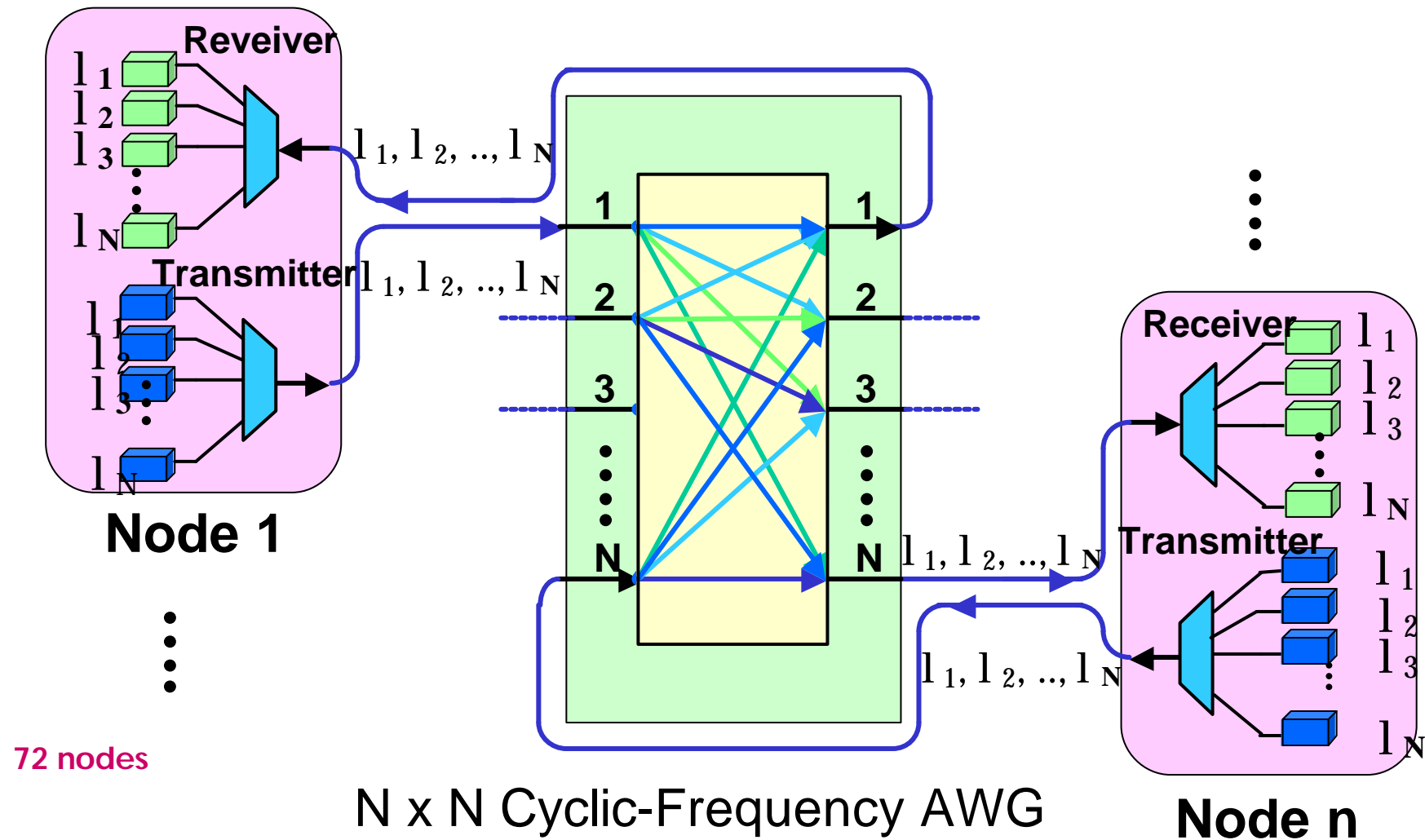


Multimedia
Interactive
Network
Digitalarian

—人間性重視の情報都市—

MIND ちとせ・21

Basic operation of wavelength routing for cyclic frequency AWG



72 nodes

5 x 5 in FY2002